REMARKS

REJECTION UNDER 35 U.S.C. 103(a)

Claims 1-7, 9-12, 16 and 18 continue to be rejected under 35 U.S.C. 103(a) as being obvious over United States Patent Number 5,292,428, Harrison et al. ("Harrison").

EXAMINER'S POSITION

The Examiner's position remains the same from the first office action that Harrison teaches a process wherein a hydrocarbon feedstock is passed through two or more hydrodesulfurization zones connected in a series, each zone containing a packed bed of solid catalyst wherein the liquid is passed from a first zone to the next until the final zone. The Examiner further mentions: make-up hydrogen being supplied to the hydrodesulfurization zone other than the first zone; hydrogen-containing gas being recovered from a subsequent hydrodesulfurization zone; target sulfur levels, etc. The Examiner believes that Harrison teaches a process and composition that reasonably appears to be either the same or an obvious variation of the instantly claimed process and composition.

Applicants argued in response to the First Office Action that Harrison neither teaches nor suggests to utilize a hydrogen-containing treat gas in the first reaction stage that contains at least a portion of hydrogen-containing treat gas supplied by a source other than the Harrison process. The Examiner countered this argument by directing applicants' attention to column 12, lines 5-17 of Harrison that reads:

"More often than not the feedstock will contain sufficient active sulphur-containing material or the hydrogen-containing gas fed thereto will contain sufficient H_2S, or both, to maintain the catalyst in sufficiently sulphided form. However if, for any reason, there should be a dangerously low level of H_2S or active sulphur-containing material at the inlet end of the first zone, then a sufficient additional amount of H_2S or of an active sulphur compound, such as CS_2, COS, and alkyl mercaptan, a dialkyl sulphide, or dialkyl dissulphide, is added to one of the feed streams to the first hydrodesulphurization zone to restore a safe level of sulphur at the inlet to the first zone."

APPLICANTS' POSITION

It is applicants' position that the Examiner is misreading the above section of Harrison and is highlighting, by underlining, various words out of context. For example, the Examiner appears to suggest that H_2S can be considred a hydrogen-containing treat gas. It is well known in the hydrotreating art that hydrogen gas (molecular) is needed to react with sulfur compounds to produce H_2S, which is then removed from the process. H_2S is a contaminant by-product gas formed by the reaction of hydrogen gas with sulfur containing compounds in the presence of a hydrodesulfurization catalyst at hydrodesulfurization conditions.

The section of Harrison that the Examiner relies on is merely directed to providing a certain minimum level of sulfur to maintain the hydrodesulfurization catalyst in an active state. Hydrogen is not required - only a sulfur-containing compound, that

may be H_2S as well as other sulfur compounds such as CS_2, COS, an alkyl mercaptan, a dialkyl sulphide, or dialkyl dissulphide. These compounds have nothing to do with a hydrogen-containing treat gas. It is very well in the hydrotreating art, and the only way from a technical point of view in which hydrodesulfurization can take place, that a substantial amount of molecular hydrogen (H_2) must be present in the "treat gas" and that the treat gas could never be H_2S, which contains an atom of hydrogen as part of the H_2S molecule. H_2S is the waste gas stream. A treat gas must always contains a substantial amount of molecular hydrogen to treat the feedstream to remove sulfur in the form of H_2S. This is make clear in applicants' specification that reads on page 9 lines 14 - 17:

> "Fresh hydrogen-containing treat gas is introduced into reaction stage R2 via line 30. Although this figure shows the treat gas flowing co-current with the liquid feedstream, it is also within the scope of this invention that the treat gas can be introduced into the bottom section of reactor R2 and flowed countercurrent to the downward flowing liquid feedstream. It is preferred that the rate of introduction of hydrogen contained in the treat gas be less than or equal to 3 times the chemical hydrogen consumption of this stage, more preferably less than about 2 times, and most preferably less than about 1.5 times."

And on page 11 of the instant specification starting with the 3rd full paragraph:

> "For purposes of hydroprocessing and in the context of the present invention, the terms "hydrogen" and "hydrogen-containing treat gas" are synonymous and may be either pure hydrogen or a hydrogen-containing treat gas which is a treat gas stream containing hydrogen in an amount at least sufficient for the intended reaction, plus other gas or gasses (e.g., nitrogen and light hydrocarbons such as methane) which will not adversely interfere with or affect either the reactions or the products. Impurities, such as H_2S and NH_3 are undesirable and, if present in significant amounts, will normally be removed from the treat gas, before it is fed into the R1 reactor."

The above excerpts from the instant specification evidence that H_2S is an unwanted impurity that would not be added at any stage of the instantly claimed process. Thus, it is applicants' position that Harrison does not teach the addition of a hydrogen-containing treat gas, from a source outside of the Harrison's process, to the first reaction stage. What Harrison does teach is that if the "recycled" hydrogen-containing treat gas they are sending from the second reaction stage to the first reaction stage is low in sulfur, then a sulfur-containing compound, such as H_2S, COS, CS_2 etc. must be added to maintain an active catalyst.

Based on the preceding arguments, the Examiner is requested to reconsider and withdraw all rejections and pass this application to allowance. The Examiner is encouraged to contact applicants' attorney should the Examiner wish to discuss this application further.

Respectfully submitted:

Date: 23 Feb. 2005

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